Claims

1. A detector (100, 200, 300, 400, 500, 600, 700, 800, 900) for detecting electromagnetic radiation, comprising a semiconductor or a semiconductor junction formed by a substrate (110, 310, 410, 510, 610) and a layer (120, 320, 420, 520, 620) arranged on said substrate (110, etc), a first electrode (130, 230, 330, 430, 530, 630, 730, 830, 930) having a first end (131, 231, 331, 431, 531, 631) and a second end (132, 232, 332, 432, 532, 632) arranged as an output end, and a second electrode (140, 240, 340, 440, 540, 640, 740, 840, 940) adjacent to said first electrode (130, etc), said electrodes (130 etc, 140 etc) being arranged on the layer (120, etc), and separated by an exposed area (160, 260, 360, 460, 560, 660, 760, 860, 960) of said layer (120, etc) arranged to receive electromagnetic radiation (150, 250, 350, 450, 550, 750, 850, 950), where received radiation (150, etc) is transformed by said semiconductor junction and said electrodes (130 etc, 140 etc) to a travelling microwave propagating towards the output end (132, etc),
characterised in that:
said electrodes (130 etc, 140 etc) are arranged essentially parallel to the surface of said substrate (110, etc) for receiving radiation (150, etc) having an angle of incident with respect to the surface of said substrate (110, etc), and a tapered structure (130, 230, 330, 430, 530, 630, 730, 830, 930, 470, 570, 670, 970) is arranged on the substrate (110, etc) to slow down a signal received from said radiation (150, etc) at a given cross section of said electrode (130, etc), compared to signals received at any preceding cross section of said electrode (130, etc) more distant from the output (132, etc) of the electrode (130, etc), so that the phase difference between said received signals is reduced or eliminated at the output (132, etc).

2. A detector (100, 200, 300, 600, 700, 800, 900) according to claim 1
characterised in that:
a tapered structure is formed by tapering said first electrode (130, 230, 330, 630, 730, 830, 930) to reduce the phase velocity of a signal received from said travelling wave at a given cross section of the tapered electrode (130, etc), compared to the phase velocity of signals received at any preceding cross section of said tapered electrode (130, etc) more distant from the output (132, 232, 332, 632) of said tapered electrode (130, etc), so that the phase difference between said signals received from said travelling wave by said tapered electrode (130, etc) is reduced or eliminated at said output (132, etc).

3. A detector (100, 200, 400, 500, 700, 800, 900) according to claims 1–2
characterised in that:
said second electrode (140, 240, 440, 540, 740, 840, 940) has an elongated *opening* into which at least one first electrode (130, 230, 430, 530, 730, 830, 930) extends, where the area between said electrodes (130 etc, 140 etc) is occupied with an exposed area (160, 260, 460, 560, 760, 860, 960) of the layer (120, 320 420, 520).

4. A detector (300, 600) according to claim 2
characterised in that:
said second electrode (340, 640) is tapered.

5. A detector (300, 600) according to claim 4
characterised in that:
said first electrode (330, 630) and said second electrode (340, 640) is separated and substantially surrounded by an exposed area (360, 660) of the layer (320, 620).

6. A detector (100, 200, 300, 600 700, 800, 900) according to claims 2 and 4–5
characterised in that:
said tapering is one of a triangular, stepwise or trapezium shape, where said shape can have chamfered or rounded parts/sections.

7. A detector (700, 800, 900) according to claims 2–6
characterised in that:
several first electrodes (730, 830, 930) are arranged in a substantially symmetrical pattern around a centre (791, 891, 991, 892, 992) so as to cancel or reduce noise detected by the electrodes (730, etc), where at least one second electrode (740, 840, 940) is arranged between every two first electrodes (730, etc), and an exposed area (760, 860, 960) of said layer is arranged between said electrodes (730 etc, 740 etc).

8. A detector (100, etc) according to claim 1–7
characterised in that:
said substrate (110, etc), layer (120, etc) and electrodes (130 etc, 140 etc) are arranged as a coplanar structure.

9. A detector (100, etc) according to claim 1–8
characterised in that:
said layer (120, etc) is a photosensitive layer.

10. A detector (100 etc) according to claim 1-9
characterised in that:
a tapered structure is formed by a tapered delay network (470, 570, 670, 970) arranged on said electrodes (130 etc, 140 etc) to delay the arrival of the received radiation (150, etc) at a given cross section of said first electrode (130, etc), compared to the arrival at any preceding cross section of said electrode (130, etc) more distant from the output (132, etc) of said electrode (130, etc), so that the phase difference between the signals received by the first electrode (130, etc) from said radiation (150, etc) is reduced or eliminated at the output (132, etc).

11. A detector (100, etc) according to claim 10
characterised in that:
said tapered delay network (470, etc) is transparent or semitransparent for the incident radiation wave (150, etc).

12. A detector (100, etc) according to claim 10
characterised in that:
said tapered delay network (470, etc) is made of a substance that is transparent to the received radiation (150, etc).

13. A detector (100, etc) according to claim 10
characterised in that:
said tapering is one of a triangular, stair-like, stepwise or trapezium shape, where said shape can have chamfered or rounded parts/sections.

14. A detector (100, etc) according to claim 10
characterised in that:
said tapering of the delay network (470, etc) has a phase matching condition for each step given as:

$$\Delta y_{i+1} = \Delta t_{ewi} V_o = \frac{c_o}{n} \Delta t_{ewi} \cdot$$

15. A receiver, a transmitter or a transceiver
comprising
a detector (100, etc) according to any preceding claim.